cific contributions shown—in the ac-knowledgments.

A particular report comes to mind that appeared under merely one author's name. It describes the properties of a rare mineral which had not been adequately characterized or previously reported from localities outside of Russia. This article was written by a mineralogist who used data obtained by a chemist (analytical determinations), a physicist (electron micrographs), and two spectroscopists (minor components).

This six-page article might have had five authors, but the fact remains that the over-all responsibility for evaluating the data depended upon a single individual, the mineralogist.

In many instances the only justification for the use of more than three authors' names seems to be the accumulation of bibliographical credit for minor contributions. This situation, if abused and it has been—can readily become ridiculous. It is discouraged, to some extent, by the use of "et al." in citing papers that are overloaded with authors.

DUNCAN McCONNELL College of Dentistry, Ohio State University, Columbus

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THE NINETEEN original papers in this important volume may conveniently be divided into two sections: The first deals mainly with reactor physics—mathematical calculations; specialized experiments; reactor safety; and a variety of related problems. (These papers will be of special value to the Western scientist, because they encompass a wide circle of problems which have not been studied or treated in the literature to any great extent.)

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IN THE LIGHT of recent data, the author has brought the 1953 edition of his work completely up to date: *fresh material derived from observations under the stereoscopic microscope* has been incorporated; the section on steel casting has been extensively *revised*, and presents a lucid explanation of how the various structures found in real castings can be fitted into the author's theory of dendritic crystallization. The approach is concrete, pragmatic and nonmathematical, and includes copious use of experimental observations on many crystals—all of which provides a highly useful volume of interest to the crystal-physics or chemical crystallography worker concerned with handling and producing real crystals. (To be published in early winter; hard cover; approx. 130 pp., illustrated; \$6.00.)

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Equipment

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■ FLOWMETER of variable-area type is available in standard models with capacities ranging from 0.0001 to 30 gal/ min for water. In operation a float rises and falls in a precision-bore glass tube, exposing more or less of a V-shaped orifice. The shape of the orifice makes float height directly proportional to flow rate. Glass models operate at pressures to 250 lb/in.² at 70°F. Operating pressures to 1000 lb/in.² are permitted by stainless-steel jackets with magnetic readout. (C-Mar Corporation, Dept. 437)

■ PHASE-SEQUENCE INDICATOR attaches to power leads of a three-phase system to indicate phase sequence by glow of a lamp corresponding to the existing sequence. The device operates at voltages from 104 to 480 v and at frequencies from 30 to 1000 cy/sec. (Opad Electric Co., Dept. 445)

ULTRAVIOLET CHROMATOGRAPHIC ANA-LYZER for petroleum analysis employs eight 3-ft-long adsorption columns. Ultraviolet illumination is provided by fluorescent tubes built into a sliding, counterweighted viewer. When the column zone boundaries have been determined, their locations are recorded on a strip chart marker pen actuated by a foot pedal. (Jarrell-Ash Co., Dept. 446)

• MERCURY LEVEL SENSOR permits automatic control by sensing the level of mercury inside the glass tubing of laboratory thermometers, manometers, and barometers. An oscillator that clips to the glass tube stops oscillating and actuates a relay as a result of the increase in capacitance caused by the rising mercury. For a conventional thermometer, $(-10^{\circ}$ to $+ 200^{\circ}$ C, 12 in.) sensitivity is equivalent to 0.4° to 0.6°C. (Instruments for Research and Industry, Dept. 451)

■ VACUUM GAGE of the Bayard-Alpert ionization type is furnished with either a nonburn-out iridium filament or a double tungsten filament. The thoriacoated iridium filament does not oxidize, and thus the gage is immune to destructive effects of air. Vacuum from 1 μ to 2×10⁻¹⁰ mm-Hg can be measured. (Veeco Vacuum Corp., Dept. 452)

■ INFRARED SPECTROPHOTOMETER, a fully automatic, continuous-scanning instrument of the grating type, offers high resolution, variable scanning speed, repetitive scanning, recording with variable abscissa and ordinate expansions,

SCIENCE, VOL. 128



and selectable double-beam and singlebeam operation. A replica grating is used in conjunction with a sodium chloride prism for dispersion. Linear wave number presentaton is preserved over the range 650 to 4000 cm⁻¹. (Beckman Instrument Inc., Dept. 455)

■ RADIATION SHIELD is composed of four separate, stacked sections which form various complete units for thin-window flow counting, and Geiger and scintillation counting. A minimum of 3 in. of iron is provided in all directions. (Baird-Atomic Inc., Dept. 466) ■ OSCILLOGRAPH of direct-writing type will record from d-c to 60 cy/sec. The galvanometer is of voice-coil design and uses a leaf-spring flexure device to avoid stiction. Coal resistance from 215 to 4000 ohm are available. Full-scale deflection of 40 mm is produced by current of 100 ma through a 215-ohm coil. Linearity is 2 percent. Electrosensitive paper is used for recording. (Mandrel Industrial Instruments, Dept. 459)

■ COUNT-RATE METER indicates logarithmically in counts per minute in four ranges: 1 to 1000; 10 to 10,000; 100 to



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10,000; and 1 to 100,000. Output of 0 to 10 mv is provided for recorder operation. Linearity is better than ± 1 percent, and stability, after warm-up, is better than 1 percent per day. (Hamner Electronics Co., Inc., Dept. 463)

■ ELECTRONIC LARYNX takes the place of vocal chords and can be used immediately after surgery. A small tube connected to a hand-held oscillator is placed in the mouth, and words are formed with tongue and lips. The device is transistorized; it weighs 6 oz and has a battery life of 30 days or more. One model can be adjusted to provide tones from 90 to 120 cy/sec, the fundamental male voice range. A model for female users has tone 1 octave higher. (Rand Development Corporation, Dept. 464)

• VAPOR-PHASE COUNTER for gas chromatographs permits various gas fractions tagged with tritium of carbon-14 to be separated during radioassay and mass assay without conversion to standard counting forms. Radioactivity of 10^{-9} is detectable. The instrument is designed for operation at temperatures up to 200°C. Four models are available with volumes 4, 12, 36 or 100 ml. (Technical Measurement Corp., Dept. 458)

DIGITAL INSTRUMENT reads d-c volts in four ranges from 0.001 to 999 v, a-c volts in three ranges from 1 to 999 v rms, and resistance in five ranges from 1 ohm to 9.99 megohm. Average measurement time is 2 sec. Indication is by threedigit wheels. Accuracies of various models are ± 1 on 10 to 1000 v a-c, ± 2 percent below 10 v a-c, and ± 0.1 percent or ± 0.5 percent on d-c and resistance. (Hycon Electronics Inc., Dept. 460)

• SAMPLING SWITCH operates by successive depression of metal reeds against a common ring by a freely rotating nonmetallic wheel. This mode of operation is said to result in total contact noise less than 15 μ v. Rate of operation can be 3000 contacts per second with up to 200 contacts per revolution. The unit will operate 1000 hr before it requires adjustment. (Genisco, Inc., Dept. 461)

■ VOLTAGE AND FREQUENCY SENSORS are available in either magnetic-amplifier or transistor-amplifier type for monitoring undervoltage, overvoltage, and voltage band and for similar frequency sensing. Action is a step function from fully on to fully off. Voltage accuracy is ± 1 percent from 18 v upward. Frequency ranges from 300 cy/sec upward with accuracy ± 2 percent. Operating temperature ranges are -55° to $+71^{\circ}$ C or -55° to $+125^{\circ}$ C. (Jordan Electronics, Dept. 467)

JOSHUA STERN National Bureau of Standards An invitation to senior scientists and engineers



A \$14.000.000 R & D Center, housing 9 new laboratories, was revealed as core of Republic's \$35,000,000 Research and Development Program at recent announcement by Mundy I. Peale, President, and Alexander Kartvell, Vice-President for Research and Development.

.... To join Republic Aviation's new **\$35** million Research and Development Program for spacecraft, missiles and advanced aircraft

In announcing Republic's \$35 million research and development program, designed to arrive at major breakthroughs in the aviation industry's transition to astronautics, Mundy I. Peale, President, set the following objectives:

> ... ACCELERATION OF PROJECTS ALREADY UNDER WAY AT REPUBLIC ON LUNAR PROGRAM FOR MANNED SPACE VEHICLES, AND MISSILES TO DESTROY ORBITING WEAPONS, AND INITIATION OF INVESTIGATIONS LEADING TO NEW CONCEPTS FOR INTERPLANETARY TRAVEL.

> "...RADICAL NEW FAMILIES OF LONG-RANGE AIR-TO-AIR MISSILES AND AIR-TO-SURFACE BALLISTIC MISSILES FOR STRATEGIC AND TACTICAL AIRCRAFT.'

> "... VERTICAL TAKE-OFF FIGHTER-BOMBERS, HIGH-MACH FIGHTER-BOMBERS, AND SUPERSONIC TRANSPORTS.'

Alexander Kartveli, Vice-President for Research and Development, emphasized that Republic's program "will not duplicate in any way investigatory work currently in progress elsewhere, but will stress novel concepts and new approaches to basic problems of missiles and space technology.

The program includes construction of a \$14 million R & D center to house 9 new laboratories, and anticipates doubling the present research staff.

Senior men interested in the new possibilities created by a simultaneous exploration of all aspects of Flight Technology are invited to study the functions of the new laboratories for more detailed information:

SPACE ENVIRONMENTAL DEVELOPMENT LABORATORY

To simulate space flight conditions and test missile, satellite and spacecraft systems and components; investigate human engineering problems.

RE-ENTRY SIMULATION & AERODYNAMIC LABORATORY

To study hypersonic shock dynamics, real gas effects, heat transfer phenomena and magnetohydrodynamics. MATERIALS DEVELOPMENT LABORATORY

Study effects of high velocity, temperature, and space environment on materials for spacecraft, missiles and advanced weapons. **GUIDANCE & CONTROL SYSTEM DEVELOPMENT LABORATORY**

To develop and test guidance and control systems for spacecraft, missiles and aircraft.

ELECTRONICS DEVELOPMENT LABORATORY

Study and explore all problems connected with highly specialized, complex electronic systems required for advanced forms of spacecraft, missiles and aircraft,

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